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STATE DOCUMENTS

ESTIMATE OF PLANNING SURVEY EXPENDITURES
FOR PERIOD BEGINNING JANUARY 1, 1969
AND ENDING JUNE 30, 1969
HPR-1(7)

MONTANA STATE HIGHWAY COMMISSION
IN COOPERATION WITH
U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION
BUREAU OF PUBLIC ROADS

Submitted October 22, 1968

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ESTIMATE OF ACTIVITIES AND
EXPENDITURES OF PLANNING SURVEY SECTION
FOR THE PERIOD OF JANUARY 1, 1969 - JUNE 30, 1969

PART I PLANNING ACTIVITIES

1. ADMINISTRATION AND CONTROL

P-1 Undistributed Overhead (Participating)

This category includes the cost of supplies and materials that cannot be separately identified and charged to specific projects. It also includes a substantial part of the salaries of the Planning Survey Manager, Assistant Planning Survey Manager and the secretarial staff.

Estimated Expenditures \$14,000

P-2 Public Hearings

This item will cover the cost of assembling traffic and other data required to support and evaluate specific route locations for public hearings. It will also be used to cover the costs of preparing exhibits that may be used at these hearings.

Estimated Expenditures \$ 500

2. ROAD INVENTORY

P-3 Road Inventory and Field Checking of Maps

The following eight counties were inventoried during 1968 by field checking maps: Golden Valley, Granite, Jefferson, Judith Basin, Madison, Park and Wheatland.

Fifteen counties have been reinventoried since the beginning of the present six-year cycle in 1967.

Estimated Expenditures \$ 9,000

P-4 Bridge Records for Defense Requirements

The regular biennial field inspection and inventory of all bridges on the Primary and Secondary Systems will be made during the Fall and Winter of 1968-1969.

The annual bridge listing of all structures and the listing of structures on selected routes for defense requirements will be compiled from the field inventory.

Estimated Expenditures \$10,000



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P-5 Railroad Crossing Hazard Ratings

The field inventory of all railroad crossings on the Federal aid Systems was completed during 1968 and some work has been done on establishing hazard ratings and signal warrants.

It is proposed to continue the development of hazard ratings and warrants for grade crossing protection during 1969.

Estimated Expenditures \$ 5,000

3. MAPPING

I Rural and General Mapping

P-6 County Maps

A considerable amount of experimentation was done to determine the best methods to be used in map scribing and the stick-up process. The remapping of Cascade County by the scribing method is nearing completion and Missoula County has been laid out for scribing. It is planned to employ two additional draftsmen in 1969 to expedite the mapping program.

General Highway Maps of all counties will be revised to reflect construction changes and road inventory data will be added to those maps that were field checked during the year.

Estimated Expenditures \$18,000

P-7 State Maps

This item includes the cost of preparing the official State Tourist Map, State Systems Map and other special State maps. The State General Highway Map will be revised and State Traffic Flow Maps of the Primary and Secondary Systems will be prepared and published during 1969.

Estimated Expenditures \$ 3,000

II Urban Mapping

P-8 Incorporated City Plats

City plats of all incorporated cities in the State will be revised as required to reflect annexations, new development, etc. The City Plat Book, which also contains aerial photographs of all incorporated cities, was not published in 1968. It is now planned to publish this book in 1969 and on a biennial basis in the future.

Estimated Expenditures \$ 4,000

P-9 City Photography

Aerial photography was obtained for Helena, Havre, and Great Falls during 1968, for use in urban transportation studies and city planning. All cities of over 5,000 population were photographed in 1966. It may be considered necessary to obtain new coverage on some of our fast growing smaller cities during 1969. All up-to-date photos will be included in the City Plat Book publication.

Estimated Expenditures \$ 1,000

III Special Mapping

P-10 Special Mapping

This item will include maps made for specific and usually non-recurring purposes such as land use maps, maps illustrating origin and destination data and accident location maps.

Estimated Expenditures \$ 1,500

4 TRAFFIC

I Volume Counts

P-11 Regular Traffic Counts

The State was divided into 5 districts in 1968 and an additional traffic recorder was hired to man the fifth district. Coverage counts are taken seasonally each year on the Federal Aid Systems and other important rural roads.

It is also planned to obtain coverage counts on urban extensions of the Federal Aid Systems and other major city streets during 1969.

The results of these counts are used to prepare the annual Traffic By Section report, traffic flow maps and for supplying various types of traffic data to the Preconstruction Division and the general public.

Estimated Expenditures \$ 30,000

II Vehicle Classification and Occupancy

P-12 Vehicle Classification Counts

Classification counts will be taken for eight-hours four-times seasonally at about 150 major intersections on the rural Federal Aid Systems. It is planned to continue to take these counts on schedule during the hours of 6 a.m. - 10 p.m. in conjunction with our regular traffic volume counting program.

P-12 (continued)

Classification of traffic on major highways at county lines was completed during 1968. Vehicles registered in Montana were classified by county of registration. Out-of-state vehicles and trucks were classified in the usual manner. The results of this study have been used in lieu of origin and destination surveys in some localities.

Estimated Expenditures \$15,000

P-13 Permanent Traffic Counters

Montana now has a total of 41 permanent counters in operation, of which 14 have loop detectors and the remainder are actuated by magnets. The loop detectors have proven to be superior in trouble free operation. It is, therefore, planned to gradually replace the old magnetic detection devices with loops. This will also entail changing the amplifiers at a cost of approximately \$130 each. It is proposed to change six counters to loop detection during 1969 at an estimated total cost of \$1,200.00.

The remainder of the funds budgeted for permanent counters will be used for repairs and general maintenance.

Estimated Expenditures \$10,000

P-14 Portable Counters

Theft and vandalism account for about four portable traffic counters each year, even tho precautions are taken to chain the counters and periodic inspections are made when they are in use. It is proposed to replace these losses and six machines that have become worn out by the purchase of ten new machines at a cost of about \$4,500.00.

The remaining estimated expenditure will be used for repairs and general maintenance.

Estimated Expenditures \$ 5,000

III Vehicle Weight Characteristics

P-15 Loadometer Survey

This is a continuing study that has been conducted each year during the summer months to determine truck loading trends and other characteristics of commercial vehicles. Twenty weigh stations are located on the Federal Aid Systems throughout the State as follows: seven stations on rural Interstate, four stations on rural Primary, one station on urban Primary and eight stations on major rural Secondary routes. Trucks are weighed for a 16-hour period from 6 a.m. - 10 p.m. at nineteen locations and for a twenty-four hour period at one

P-15 (continued)

location on the Interstate System. Vehicles are classified for twenty-four hours at all locations.

It is planned to continue weighing at 20 stations on approximately the same schedule during 1969.

Estimated Expenditures \$ 5,000

P-16 Weighing Facilities

It is planned to participate in the cost of eligible items in the construction of weighing facilities at approved locations on the Interstate System. A dual weighing facility is under construction on I 15 west of Butte which is being financed by HPR funds and another single facility has been recently let to contract on I 15 south of Great Falls. It is also anticipated that a dual weighing facility will be let to contract in 1969 on I 90 near Frenchtown.

Estimated Expenditures \$30,000

IV Design Hour Volumes

P-17 Thirtieth Peak-Hour

One hundred highest, hourly traffic volumes are selected from records of each permanent traffic counter by computer each year. The current data on the thirtieth peak or design hour volumes are published annually along with an historical record of peak hours at each counter location.

Estimated Expenditures \$ 1,000

V Directional Distribution

Directional distribution traffic data are collected at all permanent counters located on four-lane divided highways. These data are also being collected at all manual count locations throughout the State, and at special count locations for signal justification in urban areas.

No additional expenditures are anticipated for continuing to gather these data.

VI Origin and Destination Studies

P-18 Rural Origin and Destination Studies

This category includes the cost of small rural origin and destination studies that may be necessary in connection with interchange locations or route relocations on the Federal Aid Systems.

Estimated Expenditures \$ 2,000

VII Forecasting

P-19 Interstate System Estimate

This item includes the work involved in forecasting traffic volumes on each individual section of the Interstate System for the 1969 Interstate System Needs Estimate.

It also includes forecasting of future traffic volumes for individual projects on the Primary and Secondary systems.

Estimated Expenditures \$1,000

VIII Special Traffic Studies

P-20 Special Traffic Counts

This category covers special traffic counts of various types which are not included in other projects. It includes special turning movement counts taken at urban intersections for signal justification, counts on roads intersecting Interstate highways, as well as other special situations which arise during the year.

Estimated Expenditures \$ 5,000

5. HIGHWAY STATISTICS

I Mileage

P-21 Road Log, State Mileage and Local Mileage Tables

These are continuing studies which maintain a record of highway construction and maintenance on all road systems in the State. Annual reports are published showing the status of each system at the end of each calendar year.

The Road Log reports the current status of all construction on State systems by route and project. This report also contains summary mileage tables by such items as surface width and type, project class, year of construction and location by city, county, and reservation.

The State Mileage Tables report the status of each Federal Aid System at the beginning of the year, the changes that have taken place during the year and finally the status of each system at the close of the calendar year.

The Local Mileage Tables are very similar to the State Mileage Tables except that local mileage that is not on any State System is reported. Data for these tables are obtained by actual field inventory of local roads and by personal contact with officials of various road building agencies throughout the State.

Estimated Expenditures \$17,000

II Motor Vehicles, Operators and Fuels

P-22 Monthly and Annual Statistical Reports

Statistical reports on motor vehicle registrations and fuel consumption will be reported as usual on a monthly and annual basis. Statistics on all motor vehicle operators will be reported annually.

Estimated Expenditures \$ 4,000

P-23 Truck and Bus Statistics

This is a cooperative project that has been carried on in cooperation with the Gross Vehicle Weight Section. Data from truck registration certificates are transferred to IBM cards for processing. Data on the number and type of trucks registered by G.V.W. class are obtained from this activity for reports used at the State and National level. Costs are prorated between the Planning Survey and Gross Vehicle Weight Sections in proportion to the number of columns on the IBM card that are utilized for the two functions.

Estimated Expenditures \$ 2,500

III Finance

P-24 State and Local Finance Reports

Annual reports covering financial statistics for all road building agencies in Montana will be compiled and published as usual.

Estimated Expenditures \$ 3,000

6. ECONOMIC AND FISCAL

IV Highway Investment and Road Life

P-25 Road Life Studies

This project is a continuing study which maintains an historical record of highway construction by contract and maintenance betterments. It also furnishes a record of the investment in highways and highway service life. RL-3 and RL-11 Tables covering pavement life on the Interstate and Primary Systems were completed during 1968.

Estimated Expenditures \$ 2,000

P-26 Straight Line Diagrams

These diagrams present an historical record of highway construction and other major features for all projects on the Federal-aid systems. They are revised annually to reflect any changes due to construction projects or maintenance betterments. Some of the older diagrams have been completely revised during the two years. It is planned to

P-26 (continued)

continue revising older drawings until all of them have been redrawn.

Estimated Expenditures \$ 6,000

VI Construction Cost Data and Cost Indexes

P-27 Contract Analyses

This item covers the cost of the various analyses that are made of unit costs and quantities of materials on all highway and bridge projects that are let to contract during each calendar year. The results are used to compile the annual report on construction costs by mileage built, type of construction in rural and urban areas and location by county and financial district.

Estimated Expenditures \$ 2,000

P-28 Construction Cost Index

The construction cost index was revised during 1968 by the substitution of some items which more nearly reflect current construction methods. The base period was also revised from 1950 to the average of the three-year period of 1957-1959. This report will be compiled semiannually as in past years.

Estimated Expenditures \$ 1,000

IX Route Feasibility Studies

P-29 Studies of Alternate Routes

This is a contingency item for any study of this type that may develop during 1968. It will cover the cost of economic studies on proposed routes on the Primary and Secondary Systems, to determine which alternate will produce maximum benefits to the highway user at minimum costs. Economic studies of alternate routes on the Interstate System are now being done, when required as a preliminary engineering function.

Estimated Expenditures \$ 1,000

7. SYSTEMS AND PROGRAMING

I. Highway Classification and Systems

P-30 Functional Classification Study

Inasmuch as the 1968 Federal Aid Highway Act requires that a functional classification study be made on all rural roads and city streets, it is mandatory that such a study be made during 1969. Due to budgetary

restrictions on personnel it is planned to engage a consulting firm for this study.

Estimated Expenditures \$100,000

P-31 Traffic Operation Systems

Preliminary work has been done in establishing Traffic Operation Systems in Billings, Butte, Great Falls, and Missoula, during 1968. The 1961 comprehensive plans that were developed for Billings and Great Falls are being updated, and it is now planned to incorporate the final updated plans for these cities into the program. Traffic Operation Plans for these four cities will be developed during 1969.

Estimated Expenditures \$10,000

P-32 Sufficiency Ratings

A sufficiency rating of the Primary System was developed and conducted initially in 1966. The results are used to allocate State construction funds to the financial districts under State law and as an aid in formulating construction programs.

It is planned that this will be a continuing study which will require updating each year.

Estimated Expenditures \$ 7,000

8. URBAN TRANSPORTATION PLANNING

I General

It is proposed to establish an Urban Transportation department, within the Planning Survey Section after July 1, 1969 to handle future Urban Transportation Studies without the help of consultants. It is estimated that it will be necessary to add three technicians, one statistician, one economist, one graphic artist, to our present staff in order to meet the growing demand for urban transportation planning. Temporary employees will be hired as required.

P-33 Great Falls Update Study

This study has been underway since July 1, 1967 and is scheduled for completion by June 30, 1969. The updating is being done by a consulting firm.

Estimated Expenditures \$20,000

P-34 Continuing Planning Process

It is anticipated that there will be some recurring expenditures in connection with the continuing planning process in Billings, Great Falls and Missoula. Additional traffic counts will be

P-34 (continued)

required and some portions of the overall plans will necessarily have to be reevaluated in the light of changing conditions. This item will cover these anticipated expenditures.

Estimated Expenditures \$ 2,000

P-35 City Planning General

This item will cover the cost of minor planning studies in cities which are not included in major urban transportation surveys.

Estimated Expenditures \$ 2,500

9. SPEED AND TRAFFIC SERVICE STUDIES

I Speed Studies

P-36 Regular Speed Studies

Speed studies have been made each year on selected sections of highway to determine current speeds by vehicle type and to establish trends. The results of these studies are also used for safety purposes and for highway design. It is planned that this work will continue in the usual manner.

Estimated Expenditures \$ 500

P-37 Special Speed Studies

It is planned to make additional speed studies throughout the State in connection with establishing rural and urban speed zones on the Federal Aid Systems. These studies will be conducted by the Traffic Engineering Section.

Estimated Expenditures \$ 1,500

P-38 Regular Accident Studies

This project is a continuing study involving the review of all accident reports and the identification of the accident by type and location. Spot accident maps are prepared and an annual report is compiled, which compares accident rates by section on the Primary and Interstate Systems. Accident files which are compiled under this study are also used to identify high accident locations and in Phase I of the Interstate Accident Study.

Estimated Expenditures \$12,000

10. REFERENCE LIBRARY

P-39 Highway Library

A central highway library was established as a continuing project during 1964. It has been operating very satisfactorily and has been of great value in providing ready references on subjects pertaining to various phases of highway planning, construction, and operation. It is planned to continue this project through 1969.

Estimated Expenditures \$ 4,200

11. SPECIAL STUDIES

P-40 Anticipated Special Studies General

This item covers the cost of anticipated special studies that may be requested to provide answers to specific questions posed by Congress, the State Legislature, or the Montana Highway Commission. These studies are usually a one-time operation and their scope can vary widely from a simple request of a tabulation of data already on file to an extended study involving a considerable amount of special field-work.

Estimated Expenditures \$ 5,000

P-41 Interstate Cost Estimate

It is anticipated that a comprehensive cost estimate of the remaining miles of construction on the Interstate System will be required by Congress for the 1969 session.

Estimated Expenditures \$30,000

TOTAL PLANNING EXPENDITURES

\$403,200

SUMMARY OF PLANNING ACTIVITIES -- PART I
FOR PROJECT HPR-1(7) -- JANUARY 1, 1969 - JUNE 30, 1969

<u>ITEM NO.</u>	<u>PROJECT NAME</u>	<u>ESTIMATED COST</u> \$
P- 1	Undistributed Overhead (Participating)	14,000
P- 2	Public Hearings	500
P- 3	Road Inventory and Field Checking of Maps	9,000
P- 4	Bridge Records for Defense Requirements	10,000
P- 5	Railroad Crossing Hazard Ratings	5,000
P- 6	County Maps	18,000
P- 7	State Maps	3,000
P- 8	Incorporated City Plats	4,000
P- 9	City Photography	1,000
P-10	Special Mapping	1,500
P-11	Regular Traffic Counts	30,000
P-12	Vehicle Classification Counts	15,000
P-13	Permanent Traffic Counters	10,000
P-14	Portable Counters	5,000
P-15	Loadometer Survey	5,000
P-16	Weighing Facilities	30,000
P-17	Thirtieth Peak Hour	1,000
P-18	Rural Origin and Destination Studies	2,000
P-19	Interstate System Estimate	1,000
P-20	Special Traffic Counts	5,000
P-21	Road Log, State Mileage and Local Mileage Tables	17,000
P-22	Monthly and Annual Statistical Reports	4,000
P-23	Truck and Bus Statistics	2,500
P-24	State and Local Finance Reports	3,000
P-25	Road Life Studies	2,000
P-26	Straight Line Diagrams	6,000
P-27	Contract Analyses	2,000
P-28	Construction Cost Index	1,000
P-29	Studies of Alternate Routes	1,000
P-30	Functional Classification Study	100,000
P-31	Traffic Operation Systems	10,000
P-32	Sufficiency Ratings	7,000
P-33	Great Falls Update Study	20,000
P-34	The Continuing Planning Process	2,000
P-35	City Planning General	2,500
P-36	Regular Speed Studies	500
P-37	Special Speed Studies	1,500
P-38	Regular Accident Studies	12,000
P-39	Highway Library	4,200
P-40	Anticipated Special Studies-General	5,000
P-41	Interstate Cost Estimate	30,000

TOTAL PLANNING ACTIVITIES -- PART I

\$403,200

PART II RESEARCH AND DEVELOPMENT ACTIVITIES

TYPE A STUDIES

R-1 Interstate Accident Study, Phase I -- P.S.

This is a continuing study involving the comparison of traffic accident data on the Interstate System before and after construction. It is planned to include additional sections of constructed Interstate in this study as they are complete and opened to traffic.

Estimated Expenditures \$ 4,000

R-2 Drainage Area Flow Research -- U.S.G.S

This is a continuing study which has been conducted for several years under the supervision of the U.S. Geological Survey. The objective is to provide data concerning the magnitude and frequency of floods on small drainage courses. The results of this study are used by our design department to determine the proper size of various drainage structures.

Estimated Expenditures \$11,000

R-3 Drainage Correlation Research -- M.S.U.

This has been a continuing project since 1963 under the jurisdiction of Montana State University. It is designed to correlate stream flow from our drainage courses with such factors as precipitation, wind velocity, temperature, vegetative cover, soil types, etc.

The original completion date of this project was June 30, 1967 but a 3-year extension to June 30, 1970 was approved November 16, 1966. The instrumentation will be left in place and the record keeping and analysis will continue as usual until 1970.

Estimated Expenditures \$12,000

R-4 Roadside Reseeding Research -- M.S.U.

This item is a continuation of an approved research project under the jurisdiction of the Agricultural Experiment Station of Montana State University at Bozeman. The project involves investigation of grasses and other vegetative cover that is adaptable to climatic conditions and soil types encountered in highway construction in Montana. The objectives are to prepare recommendations concerning the type of vegetation to be seeded, the type of machinery necessary for the application and to develop application specifications.

The revised prospectus and work plan was approved for this project on December 6, 1967. The approved revisions generally direct the project into more realistic and productive channels such as top soiling, soil sterilization and roadside spraying for control of weeds. The total estimated cost of \$163,000 remains the same but the date of completion was extended one year to December 31, 1969.

Estimated Expenditures \$16,000

R-5 Lithified Shales Research -- M.T.

This continuing project, under the supervision of the Montana School of Mineral Science and Technology, consists of an investigation of the swelling properties of lithified shales which are prevalent in eastern Montana. The objective is to determine the effects of moisture and load removal on shale expansion.

Instrumentation was installed on Project I-IG-94-1(17) east of Billings during the fall and winter of 1967-68. Regular readings have been taken and work has been started to correlate the data being submitted weekly from the test site.

A revised prospectus and work plan was approved June 27, 1968. The revisions included the extension of the completion date from June 30, 1968 to October 31, 1969, and an increase in the total cost of the project from \$40,500 to \$55,000.

Estimated Expenditures	\$ 4,000
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R-6 Subscription to Highway Research Correlation Service

This item covers the cost of a subscription to the Highway Research Correlation Service.

Estimated Expenditures	\$14,500
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R-7 Research Contingency Fund

This item will cover the cost of any research project that may be approved after January 1, 1969.

Estimated Expenditures	\$25,000
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R-8 Undistributed Overhead

This item will cover salaries and other incidental expenses not directly chargeable to individual research projects.

Estimated Expenditures	\$ 5,000
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Subtotal Type A Studies	\$91,500
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TYPE B STUDIES

None

TOTAL RESEARCH AND DEVELOPMENT	\$91,500
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SUMMARY OF RESEARCH AND DEVELOPMENT ACTIVITIES
PART II FOR PROJECT HPR-1(7)
JANUARY 1, 1969 - JUNE 30, 1969

<u>ITEM NO.</u>	<u>PROJECT NAME</u>	<u>ESTIMATED COST</u> \$
<u>TYPE A STUDIES</u>		
R-1	Interstate Accident Study, Phase I -- P.S.	4,000
R-2	Drainage Area Flow Research -- U.S.G.S.	11,000
R-3	Drainage Correlation Research -- M.S.U.	12,000
R-4	Roadside Reseeding Research -- M.S.U.	16,000
R-5	Lithified Shales Research -- M.T.	4,000
R-6	Subscription to Highway Research Correlation Service	14,500
R-7	Research Contingency Fund	25,000
R-8	Undistributed Overhead	<u>5,000</u>
	Subtotal Type A Studies	\$91,500
	Type B Studies - none	
	Total of Research and Development Activities -- Part II	\$91,500
	Total of Planning Activities--Part I	\$403,200
	GRAND TOTAL	\$494,700

Code:	M.S.U.	Montana State University	P.S.	Planning Survey
	M.T.	Montana College of Mineral Science and Technology	U.S.G.S.	U.S. Geological Survey

SUMMARY OF RESEARCH PROJECTS
STATE PROJECT HPR-1 (7) WORK PROGRAM - PART II
JANUARY 1, - JUNE 30, 1969

<u>STUDY NUMBER</u> <u>BPR</u>	<u>STATE</u> Continuing Studies -	<u>TITLE OF STUDY</u> Type A	<u>ESTIMATED</u> <u>COST 1962</u> \$	<u>TECHNICAL</u> <u>RESPONSIBILITY</u> <u>FOR MONITORING</u>
R-1		Interstate Accident Study - Phase I	4,000	
R-2		Drainage Area Flow Research	11,000	
R-3		Drainage Correlation Research	12,000	
R-4		Roadside Reseeding Research	16,000	
R-5		Lithified Shales Research	4,000	
		Total Continuing Type A Studies	\$ 47,000	
		Type B Studies	None	
		New Studies	None	

PART III A - NON-PARTICIPATING ITEMS

Undistributed Overhead

This item includes the cost of utilities and the rent of office space for the Planning Survey Section.

Estimated Expenditures \$ 5,700

PART III B - NATIONAL HIGHWAY SAFETY BUREAU PROJECTS

Driver License Conversion to Data Processing

This project which is under the Highway Patrol's jurisdiction will convert the Montana driver license file from manual to automated data processing and will eventually lead to a centralized record keeping system by computer. The project period is from December 1, 1967 to June 30, 1969.

Estimated Expenditures	\$107,464
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